

How condo managed to save energy and money; Large-scale air-to-water heat pumps have the potential to eliminate carbon emissions from virtually every residential building in Canada

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Body

From the outside, the French Quarter condos look like Hausmanian buildings from Paris that have been teleported from the 19th century onto Richmond Street East.

But sitting on the roof are two van-sized boxes that make other buildings look like they're in the past.

Canada's first large-scale residential air-to-water heat pumps are a technology that could eliminate the carbon emissions from virtually every apartment and condo in the country.

Hoisted by crane to replace a natural-gas-fired boiler in December, the Italian-built equipment now provides air conditioning and heat to 160 units, powered entirely by Ontario's 90 per cent carbon-free electricity.

This project wasn't headed by the government, or a large corporation intent on disrupting the HVAC market. It was the product of hundreds of hours of work by volunteer condo board members, who were simply "desperate to decarbonize."

At a reception this week, residents gathered on the sun-soaked rooftop patio to celebrate the successful heat pump installation, which promises to reduce their emissions by 60 per cent or more.

"If it wasn't for you all deciding 'We want to do something better. We want to do something greener, cleaner, more efficient and at the same time get off' natural gas, we wouldn't be here today," lead engineer Mark Greenhill said to the assembled crowd.

Natural gas heating produces 54 per cent of all emissions in the city of Toronto, according to the 2022 Climate Action Annual report. To achieve the city's goal of net zero emissions by 2040, every house, apartment, condo tower and office building will have to switch to heating with electricity when existing equipment wears out.

While much of the existing government focus has been on encouraging people in single-family houses to switch to heat pumps, big cities such as Toronto, Montreal and Vancouver will have to contend with electrifying heat in tens of thousands of multi-residential buildings.

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"If our building could figure it out, everyone can," said Karima Dharssi, a member of one of the French Quarter condo boards. (There are two, one for each building.) "Everything that could go wrong did go wrong. We didn't have the space. We didn't have the money. But we solved those problems."

Dharssi joined the board two years ago with the goal of bringing in energy efficiency measures to save money and reduce the buildings' carbon emissions. They started small, swapping light bulbs for LEDs and adding motion sensors. But when the building's chiller conked out during a heat wave in 2021, it opened up an opportunity for transformational change.

"Usually on a board, you tend to do the cheapest, like-for-like replacement. But here, we spent more because we wanted to make the case that it will decrease costs over the long run and will be better for the planet," she said.

Along with fellow board members Cathy Burrows, Henry Chudak and Karen Smith, they read up on heat pumps, and decided to make the switch because they're more than twice as efficient as boilers, do double duty as a source of heat and air conditioning and dramatically reduce carbon emissions.

"You've got to be part of the solution," said Burrows. "I have great-nieces and nephews. Somebody's got to go and do the right thing for them."

The first problem they encountered was the price. They got a quote that was well beyond what they were willing to pay. So they turned to Mitsubishi - a manufacturer known for producing some of the most advanced heat pumps that operate at the coldest temperatures - and negotiated a price they could live with.

When all was said and done, the project cost a little more than \$560,000, which was \$160,000 more than a straight boiler and chiller replacement would have cost, or about \$1,000 per unit.

They received rebates from the Independent Electricity System Operator and Enbridge and a grant from The Atmospheric Fund, which helped with the project as a test case for decarbonizing other buildings.

"This particular project, we were interested right off the bat because of the emission reduction potential for sure, but also because of this particular use of technology: A drop-in replacement for a chiller really has the potential to scale and we wanted to do what we could to make sure the project was a success," said Keith Burrows, who manages TAF's retrofit accelerator team.

The air-to-water heat pump replaces the buildings' central chiller and one of the boilers. (The other is kept to operate at temperatures below -10 C.) It hooks right into the existing heating and cooling system, without any need to have work done in individual units.

"It was not easy work, but compared to a lot of other solutions, it was relatively straightforward and it wasn't invasive for residents," he said.

In addition to providing some funding, TAF brought in the Toronto and Region Conservation Authority to monitor the performance of the system, the carbon reductions and residents' comfort levels to produce real-world data that can be presented to other condo boards and landlords considering the switch.

With funding secured, the French Quarter condo boards brought in engineer Mark Greenhill to design the new heating and cooling system, and that's when the second problem appeared: there wasn't enough room on the roof for the condensers, or enough space in the mechanical room for the piping.

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"We had to basically fit all of this equipment into the building. We had to come up with some creative solutions," Greenhill said. "But I just put the drawings together. It's Rich (Morais), the foreman here, who had to build it. And this guy, he made a real work of art."

Morais, who works with Prestige Mechanical, took residents on walking tours of the new equipment during the reception, said he wasn't sure it could be done.

"When I first saw the equipment arrive, I said: 'You guys got the wrong building.' "

Standing amid a rabbit's warren of piping in the mechanical room, Morais and his team proudly explained the finer details of the installation. Then they took people out on the roof to see the large steel units on their custom-welded stands.

It was hard to focus on the equipment with the spectacular view of downtown Toronto bathed in golden light from the setting sun.

"It's a great view," he said.

One that carbon emission-reducing retrofits like this are helping to preserve for coming generations.

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